

WHAT IS CLAIMED IS:

1 1. A cleaning system adapted for cleaning semiconductor processing
2 equipment, said cleaning system comprising:
3 a remote dissociator coupled to said equipment by a transport mechanism;
4 a local dissociator integrally related to said equipment; and
5 a precursor disposed in said remote dissociator;
6 wherein said remote dissociator is operable to dissociate said precursor to
7 create a first plurality of cleaning radicals, said cleaning radicals entering said transport
8 mechanism, a first portion of said cleaning radicals entering said equipment and a second
9 portion of said cleaning radicals recombining to create a plurality of less reactive
10 elements in said transport mechanism, said less reactive elements entering said
11 equipment, and said local dissociator operable to dissociate a portion of said less reactive
12 elements to create a second plurality of cleaning radicals.

1 2. The cleaning system of claim 1 further comprising an optical
2 endpoint detector, wherein said detector indicates completion of a cleaning of said
3 equipment.

1 3. The cleaning system of claim 1, wherein said remote dissociator
2 provides a greater than 75% dissociation efficiency, whereby PFCs in an exhaust from
3 said cleaning system are reduced.

1 4. The cleaning system of claim 1, wherein said first portion of said
2 cleaning radicals is less than said second portion of said cleaning radicals.

1 5. The cleaning system of claim 1, wherein said second plurality of
2 cleaning radicals includes ions.

1 6. The cleaning system of claim 5, wherein said cleaning radicals
2 include at least one of: Cl, F, Cl ions, or F ions.

1 7. A method of cleaning a semiconductor processing equipment, said
2 method comprising:
3 introducing a precursor to a dissociator;
4 dissociating said precursor to create a first plurality of radicals;

5 introducing a first portion of said first plurality of radicals to said
6 equipment, a second portion of said first plurality of radicals re-associating to create less
7 reactive elements;

8 introducing said less reactive elements to said equipment; and
9 dissociating said less reactive elements to form a second plurality of
10 radicals in said equipment.

1 8. The method of claim 7, wherein said dissociating said precursor
2 provides at least 75% dissociation efficiency, whereby PFCs in an exhaust from said
3 system equipment are reduced.

1 9. The method of claim 7, wherein said second portion of said first
2 plurality of radicals is greater than said first portion of said first plurality of radicals.

1 10. The method of claim 9, wherein said precursor comprises a
2 flourinated species capable of supplying atomic flourine.

1 11. The method of claim 7, wherein said second plurality of radicals
2 includes cleaning ions.

1 12. The method of claim 11, wherein said cleaning ions include at least
2 one of F ions or Cl ions.

1 13. The method of claim 7, wherein said dissociating said less reactive
2 elements creates physical sputtering.

1 14. The method of claim 7, wherein said less reactive elements include
2 at least one of F₂ or Cl₂.

1 15. The method of claim 7, further comprising: introducing a second
2 precursor to said equipment.

1 16. The method of claim 15, wherein said second precursor comprises
2 oxygen.

1 17. The method of claim 16, wherein said oxygen combines with
2 carbon on said equipment to form CO_y.

1 18. A method of cleaning a semiconductor processing equipment, said
2 method comprising:
3 introducing a first precursor to a remote dissociator;
4 dissociating said first precursor to create a first plurality of radicals;
5 introducing said first plurality of radicals to said equipment;
6 introducing a second precursor to said remote dissociator;
7 dissociating said second precursor to create a second plurality of radicals;
8 introducing a first portion of said second plurality of radicals to said
9 equipment, a second portion of said second plurality of radicals re-associating to create
10 less reactive elements;
11 introducing said less reactive elements to said equipment; and
12 dissociating said less reactive elements to form a third plurality of radicals
13 in said equipment.

1 19. The method of claim 18, wherein said third plurality of radicals
2 comprise Cl and said first plurality of radicals comprise F.

1 20. The method of claim 18, wherein said dissociating said first
2 precursor includes forming a first plasma and said dissociating said less reactive elements
3 includes forming a second plasma.

1 21. A semiconductor equipment cleaning system comprising:
2 a housing;
3 a remote dissociator configured to dissociate a first gas remote from said
4 housing, said dissociation forming a second gas;
5 a gas delivery system to introduce a portion of said first gas, a portion of
6 said second gas, and a re-associated portion of said second gas into said housing.
7 a local dissociator configured to dissociate said re-associated portion of
8 said second gas;
9 a controller for controlling said remote dissociator, said gas delivery
10 system, and said local dissociator; and
11 a memory coupled to said controller, said memory comprising a computer-
12 readable medium having a computer-readable program embodied therein for directing

operation of said semiconductor cleaning system, said computer-readable program comprising:

- an instruction to control said remote dissociator;
- an instruction to control said gas delivery system; and
- an instruction to control said local dissociator.

22. A computer-readable storage medium having a computer-readable program embodied therein for directing operation of a semiconductor cleaning system, said semiconductor cleaning system comprising an equipment, a remote dissociator, a local dissociator, and a gas delivery system configured to introduce a gas from said remote dissociator into said equipment, said computer-readable program including instructions for operating said semiconductor cleaning system in accordance with the following:

- introducing a precursor to said remote dissociator;
- dissociating said precursor to create a first plurality of radicals;
- introducing a first portion of said first plurality of radicals to said equipment by way of said gas delivery system, a second portion of said first plurality of radicals re-associating to create less reactive elements;
- introducing said less reactive elements to said equipment by way of said gas delivery system; and
- dissociating said less reactive elements to form a second plurality of radicals in said equipment.